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ABSTRACT

To examine the effectiveness of a maternal intervention curriculum, 40 mothers and children with varying degrees of language delay were assigned to one of two intervention groups matched on child characteristics. Program impact was assessed through standardized tests (the Sequenced Inventory of Communicative Development to measure whether intervening with mothers appreciably affected children's overall receptive and expressive language levels, the Bayley Mental Scale or the Pictorial Test of Intelligence to measure whether intervention appreciably affected children's IQ) and a coding system designed to measure reciprocity of early mother/child language usage in the free play interaction. As hypothesized, 14 of 16 mothers who participated in the project decreased their use of directive speech compared to only 7 of 12 controls. A second hypothesis, that project mothers would increase use of contextual speech relative to controls, was also supported. A final hypothesis, that project mothers would increase usage of both expansions and extensions relative to controls, was not supported. (CL)

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The Modifiability of Maternal Language Use
and its Effect on
Delayed Child Language Acquisition

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The Language Interaction Intervention Project, a federal H.C.E.E.P. demonstration project presently starting its third year of funding, is housed at the Institute for the Study of Child Development, Department of Pediatrics, Rutgers Medical School. Although children are treated within the context of the project, mothers constitute the primary target. While involved in the project, they are taught a series of language enhancing strategies and are observed, by project staff, to use these strategies as they interact with their language delayed children.

The project theoretically evolved from three streams of the mothers' speech literature. The research on the characteristics of mothers' speech has indicated that mothers speaking to young language learning children speak simply and redundantly (Snow, 1972), and make a great many allusions to the visible context. (Philips, 1973) Further research on the use of these special characteristics has indicated that certain maternal language variables might act to promote child language acquisition. For example, high proportions of expansions and repetitions (Newport, Slutman, and Glutman, 1978, Cross, 1978) as well as a proportionately high use of maternal extensions (defined as the provision of additional semantic information, Newport et. al, 1978) have been associated with rapid linguistic growth. Finally, mothers of language handicapped children have been found to provide less semantic information (Newhoff, Silverman, and Millett, 1980), a lower rate of contingent responses (Weistuch, 1982) and lower rates of expansions and repetitions (Macpherson and Olson, 1980)

than mothers speaking to non-handicapped children of the same language level. It has been theorized that the handicapped child's less efficient use of communicative strategies might result in this less appropriate matching. (Snyder and Maclean, 1980).

The present project has been undertaken to determine if mothers can be taught to sidestep their children's poor cueing abilities and learn to provide a rich language environment. It has been designed to answer the following two questions:

(1) Are mothers able to learn to alter their speech in accordance with a "language enhancing curriculum" specified by the project?

(2) Assuming that they are able to alter their speech in the desired ways, does their doing so affect the rate at which their children learn to speak?

The service delivery component of the project is short-term. Mothers and their children are provided with forty two-hour sessions. For the first hour of each session, mothers and children are seen separately, children are seen in groups of four or five and are given group language stimulation under the guidance of a certified speech pathologist and a teacher's aide. Mothers, during this time, are provided with hour-long lecture workshops designed to explore both the nature and progression of language development, the engineering of the environment for speech facilitation, techniques for mapping language onto the observable context, and techniques for eliciting specific linguistic structures. During the second hour of class, mothers

and children work together under the guidance of project staff. Throughout all sessions, the importance of attention to children's interests, vocalizations, and words is stressed. The elicitation of language is viewed as having to occur within a naturalistic context.

MATERNAL INTERVENTION PACKAGE

The maternal curriculum consists of forty one-hour sessions designed to cover twenty topics. It is believed by the investigators that providing parents with knowledge about the process of language acquisition (in particular, about the rules children learn and their developmental order), the types of difficulties which impede language acquisition (in particular, discrimination and/or generalization problems which result in difficulty in learning linguistic rules), and techniques which can be used to strengthen discrimination and generalization weaknesses is as important as the teaching of specific strategy skills. Knowledge of process and of process deficits is viewed as crucial to the parent's learning to apply strategies not in a limited teaching to task manner but rather across contexts and with an eye to the child's developmental needs. For this reason, the first several workshops are devoted to discussing the development of mental representation, the use of mental representation in symbolic combinatorial play, the importance of play for the development of language use, the content areas through which the child sees and later begins to verbalize his world, and the engineering of the environment so as to facilitate the child's

use of these content areas. Once these areas have been covered, emphasis is placed on language development itself--from gesture, through single words, through early word combinations, through the learning of syntactic rules. Throughout all workshops, normal development, atypical problems which impede normal development, and ways to strengthen weaknesses are addressed.

After the foundation has been laid, more specific techniques (e.g., parallel talking, elicitation of requests, answers, and comments, use of prompts, repetitions, expansions, semantic extensions, and syntactic recasts) are presented. For a full list of workshop titles, please refer to Table 1.

During each workshop period, mothers are encouraged to talk about their experiences using the strategies, about questions concerning the strategies, and about questions concerning the integration of strategies with each other. Because getting the child's attention is so closely allied with use of the strategies additional questions concerning behavior are also welcomed and discussed. All workshops are audiotaped so that mothers unable to attend specific lectures can become familiar with the material covered.

For the first part of the second hour, mothers observe the process through which staff integrate the strategies into the context of classroom activities. Then, mothers and children are invited to participate in two activities. The first of these activities is semi-structured with staff providing materials. The second activity is always free-play time and mothers are encouraged to try to help their children to engage in symbolic

Table 1
Workshop Topics

1. Mental representations
2. Facilitation of mental representations: symbolic play
3. Communicative regulation: the request, the protest, and the comment
4. Facilitation of communicative regulation: activation of content areas.
5. Helping the child to develop word categories from content areas
6. Word category combinations: the beginnings of multiword speech
7. Contextual mapping
8. Maternal act mapping
9. Child act mapping
10. Mapping as a facilitator of rule acquisition.
11. Early rules: Developmental Order of Acquisition
12. Facilitation of the response: use of the wh question
13. Facilitation of the response: use of the binary question
14. Facilitation of the response: use of the recast
15. Facilitation of the response: use of modeling and prompting
16. Facilitating the request
17. Facilitating the comment
18. Responding to child utterances: negating, correcting, and reinforcing
19. Responding to child utterances: expanding
20. Responding to child utterances: extending

play. While mother/child activities are being carried out, the program director and speech pathologist circulate among the dyads, modeling, reinforcing, providing feedback and giving suggestions.

Method

At this time, 28 dyads have passed through the project and 19 more are presently enrolled. For research purposes, a sequential cohort design has been used. Forty mothers and children (with varying diagnoses and degrees of language delay) were recruited and assigned to one of two intervention groups matched on child characteristics. The second group served as the first group's control and was served after the first group completed intervention. As both groups were evaluated and as both groups of mother/child pairs were taped in free-play interaction before group 1 began participating in the project, program impact on group 1 was able to be measured. When group 2 was ready to begin intervention, control subjects were obtained for them and the same procedure was repeated. These control subjects now constitute group 3--the final group of subjects to be seen under the present intervention grant.

Program impact has been assessed through use of both standardized tests (the use of the Sequenced Inventory of Communicative Development to measure whether intervening with mothers appreciably affected childrens' over-all receptive and expressive language levels; the use of either the Balyey Mental Scale or the Pictorial Test of Intelligence to measure whether intervention

appreciably affected childrens' I.Q.) and a coding system designed to measure the reciprocity of early mother/child language usage in free play interaction. This last measure was the one considered most germane to the project as it was specifically designed to measure changes in the language behaviors targeted by the intervention. This coding system is presented in Table 2.

Note that both mothers and children are coded on both initiation and response linguistic behaviors. Maternal initiation behaviors can broadly be grouped under directive behaviors, contextual reference behaviors and questioning behaviors. Maternal response behaviors consist of round continuing behaviors (extending, expanding, correcting, and prompting) and round-ending behaviors (negating, acknowledging and reinforcing). Child initiation behaviors can broadly be divided into questioning and commenting components. Response behaviors are judged as adequate, inadequate, or lacking.

RESULTS

HYPOTHESES

The following hypotheses were advanced:

(1) Mothers who attended the project would decrease their use of directive speech relative to controls.

(2) Mothers who attended the project would increase their use of contextual speech relative to controls.

(3) Mothers who attended the project would expand upon their children's speech significantly more than controls.

TABLE 2

Language Interaction Coding System

<u>Child Speech Initiations</u>	<u>Maternal Responses</u>	<u>Maternal Speech Initiations</u>	<u>Child Responses</u>
1. <u>C requests action</u>	M acknowledges M doesn't acknowledge	1. <u>Commands</u>	complies complies inadequately doesn't comply
2. <u>C requests answer</u>	M answers M doesn't answer	2. <u>Directions/Suggestions</u>	complies complies inadequately
3. <u>C protests</u>	M acknowledges M doesn't acknowledge	3. <u>Attentionals</u>	looks doesn't look
4. <u>C labels</u>	M acknowledges M ignores M expands M extends M reinforces M corrects	4. <u>Wh request/information</u>	answers answers inadequately doesn't answer
5. <u>C informs</u>	M acknowledges M ignores M expands M extends M reinforces M corrects	5. <u>Wh request/labels</u>	answers answers inadequately doesn't answer
6. <u>C answers</u>	M acknowledges M doesn't acknowledge M expands M extends M reinforces M corrects M negates	6. <u>Binary requests/information</u>	answers answers inadequately doesn't answer
7. <u>C complies</u>	M guides M reinforces M describes M extends M acknowledges M ignores	7. <u>Descriptions of context</u>	doesn't respond responds inadequately repeats responds contingently
		8. <u>Describes M's act</u>	doesn't respond responds inadequately repeats responds contingently
		9. <u>Describes C's act</u>	doesn't respond responds inadequately repeats responds contingently
		10. <u>Labels</u>	doesn't respond responds inadequately repeats responds contingently
8. <u>C requests repetition</u>	M repeats M doesn't repeat		

(4) Children whose mothers modified their language in accordance with program targets would demonstrate significantly more expressive language use than children whose mothers showed no linguistic modifications.

METHOD OF DATA ANALYSIS

Twenty-eight mother-child pairs were seen, 16 experimental pairs, 12 control pairs. Non-parameter statistics were used since descriptive statistics indicated that the data were not normally distributed. For each maternal language variable, mothers were divided into experimental and control groups and were then further divided by whether or not they increased or decreased their use of the variable over time. Chi-squares were then computed on each variable in order to assess the likelihood of intervention-based change.

In any intervention program in which the primary target is the mother, we must, before examining child change, ask if intervention affects maternal behavior. A variety of factors might influence whether or not mothers profit from the program. Is the mother present the majority of the time? Is she receptive to doing things in a new way? Does she practice what she is learning? If she is receiving intervention but is not profiting from it, we cannot measure the impact the intervention is having upon her child.

An additional factor to be considered is that mothers who do not receive the intervention might nevertheless be picking up the information in other ways. For our purposes, this is

especially crucial as the majority of our mothers attend or have attended early intervention programs with their children. Although these programs might not offer formal training packages, they certainly do offer information related to children's education.

In order to measure the effectiveness of our intervention, we then chose to examine for each variable the number of experimental mothers who increased or decreased usage of the variable relative to controls. Thus, if 14 out of 16 experimental mothers increased their use of contextual speech while only 2 out of 12 control mothers did so, we could say that our intervention was successful.

Following this argument further, we need to look at child progress in terms of maternal progress--not in terms of whether or not mothers participated in the experimental group. There is a theoretical rationale for believing that maternal language use impacts upon child language acquisition; if maternal language changes in the expected ways, we would predict changes in child language regardless of whether or not mothers had received our program package. Using the example we have used previously, we would take the 2 control mothers who had also increased their use of contextual language and add them to the 14 experimental mothers who had done so. We would then compare the progress of the children whose mothers had increased content use with those who had not.

This design is not commonly used to measure intervention effectiveness. In most mother-child intervention studies,

children are grouped by whether or not their mothers have received intervention and program effects on the children are examined accordingly. (McCankey and O'Connor, 1982; Weistuch, 1982; Metzel, 1980) Grouping in this manner does not allow for an examination of child progress in light of maternal gains. Lewis and McGurk (1972) argue that an effectiveness of an intervention can only be measured through an assessment of the specific content changes targeted by the intervention. For this reason, data have been analyzed in the way described.

MATERNAL LANGUAGE CHANGES

Directive Changes: It was hypothesized that mothers who attended the project would decrease their use of directive speech relative to controls. This hypothesis was supported by the data. 14 of the 16 mothers who attended the project showed a decrease in command usage while only 7 of the 12 control group mothers did so. Stated differently, for all mothers showing a decrease in frequency of command usage, 66.7% attended the project. The difference between the two groups of mothers approaches significance ($p < .08$). When a more stringent criterion for increase or decrease was applied (mothers had to demonstrate frequency increases or decreases of 25% before being assigned to increase or decrease groups), the trend was found to still hold. ($p < .09$) 10 experimental mothers decreased usage by this margin while only 6 control mothers did so.

Contextual Changes: It was hypothesized that mothers who attended the project would increase their use of contextual

speech relative to controls. This hypothesis was again supported by the data. When the criterion of 25% change was used, notable differences in increases of usage were found for contextual references, maternal act references and child act references. These differences are presented in Table 3.

Note that all 16 mothers in the experimental group increased by at least 25% the amount that they referred to visible objects, actions, and events while only 9 out of the 12 control mothers did so. Stated differently, the 25% increase group was composed of 64% experimental as opposed to 36% control group mothers. This difference is significant.

Although differences were not quite as marked for the other two contextual variables (references to maternal acts, references to child acts), trends in the expected direction continued to be observed. While all 16 of the mothers in the experimental group increased by at least 25% the amount that they referred to their own acts, not all of the control mothers did so. This difference approaches significance. ($p < .09$) Similarly, while 14 out of 16 experimental mothers increased by 25% or more the amount that they referred to their children's acts, only 7 out of 12 control mothers did so. This difference again approaches significance. ($p < .09$)

RESPONSE CHANGES

Two types of response changes were of particular interest:

(1) Maternal increases in expansions (syntactic elaborations upon children's utterances)

Table 3
Contextual Changes Over Time

Variable	E increase	C increase	E decrease	C decrease	p
context	16 (64%)	9 (36%)	0	3 (25%)	.03
M's act	16 (61.5%)	10 (38.5%)	0	2 (100%)	.09
C's act	14 (66.7%)	7 (33.3%)	2 (28.6%)	5 (71.4%)	.08

Table 4
Response Increases Over Time

Variable	E increase	C increase	E decrease	C decrease	p
extends	16 (59.3%)	11 (40.7%)	0	1 (100%)	.24
expands	15 (60%)	10 (40%)	1 (33.3%)	2 (66.7%)	.79

(2) Maternal increases in extensions (semantic elaborations upon children's utterances which function to maintain the topic).

It was hypothesized that mothers who attended the project would increase usage of both of the above categories relative to controls. A cursory inspection of the data indicate that this hypothesis is not supported. Rather, as Table 4 shows mothers in both groups increase their use of expansions and extensions over time. While the differences are weighted slightly in favor of the experimental group (all 16 of the experimental mothers increased their use of extensions at least 25% and 15 out of 16 experimental mothers increased expansion use by the 25% margin, not all control mothers did so), differences are small and primarily indicate that mothers increase their usage of these response types over time--a finding that has been documented elsewhere in the motherese literature. (Moerk, 1975)

DISCUSSION

The language interaction intervention project described in this paper targets several objectives for parent language change. Parents are taught to be less directive, more referential, and more responsive when communicatively engaging their children.

The data just presented certainly indicate that some parameters of maternal speech are modifiable. In particular, mothers appear to be able to alter their manner of initiating language when they are in interaction with their language delayed children. Experimental mothers were able to demonstrate decreases

in their use of commands relative to controls. When contrasted with controls, experimental mothers, after completing the program, also showed significantly higher levels of contextual reference, reference to maternal acts, and reference to child acts. All four of these initiation changes were targeted by the present project.

From a theoretical perspective, the contextual changes should impact upon child language growth. Verbal-contextual redundancy (the broad category under which all three context variables fall) has been documented as an outstanding feature of mother's speech (Bloom, 1973; Broen, 1972; Philips, 1973) and Bloom (1976) has considered it to be an important facilitator of child language categories. Indeed, it would appear that as the number of bridges between context and language are increased for the child, both his vocabulary and his knowledge of the relationships between objects and actions should increase concomitantly.

Maternal speech addressed to handicapped children has been documented as more controlling. (Bruim, Rynders, and Turnure, 1974; Weistuch, 1982) than that addressed to non-handicapped children matched for age or for language level. If children construct mental representations (Piaget, 1952) and if these constructions contribute to the child's ability to manipulate broad cases in both language and play (Jurkovic, 1978; Dansky, 1980), decreases in controlling behavior should increase the child's opportunity to construct representations of his world. For this reason, mothers who attended the project were encouraged

to talk about and build play around the things to interest to their children rather than to attempt to control the communicative flow. Our data support that they were able to learn this lesson. Again, from a theoretical perspective, we expect this maternal language change to contribute to child language growth.

We had less success with impacting upon maternal responses (as measured by increases in use of maternal expansions and extensions). Both experimental and control mothers substantially increased their use of these language responses over time-- indicating most probably that children grew some in the intervening period and that mothers increased their use of expansions and extensions accordingly. That these categories are adjusted to children's level of speech has been documented elsewhere in the literature. (Moerk, 1976) Since both groups of mothers changed over time, it might mean:

- (a) that intervention along this parameter is not needed,
- (b) a more fine-grained technique for measuring differences of quality in the two categories needs to be developed.

Child data have yet to be analyzed. Since many of our maternal changes are in the expected direction, we are hopeful that child language will show the expected gains.

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